WHAT IS CLAIMED IS:

1. A method for reconstruction of the attenuation density of an object from X-ray projection image data values, comprising the steps of:

- representing the attenuation density of said object by a sum of predetermined continuous harmonics with unknown coefficients;

- relating each of said X-ray projection image data values to an integral of the attenuation density of said object, and thus to a corresponding sum of sums of said predetermined continuous harmonics with unknown coefficients;

- determining said unknown coefficients from the relations between each of said X-ray projection image data values and the respective corresponding sum of sums of said predetermined continuous harmonics with unknown coefficients; and

- reconstructing the attenuation density of said object by said sum of predetermined continuous harmonics with said determined coefficients.

2. The method of claim 1 wherein different ones of said predetermined continuous harmonics represent different spatial frequencies of the attenuation density of said object.

3. The method of claim 1 wherein said predetermined continuous harmonics are any of Newton polynomials, spline interpolating functions, Fourier harmonics, Bessel functions, and Green functions.

4. The method of claim 3 wherein said predetermined continuous harmonics are selected to be of the kind, which minimizes the coupling of equations for given symmetries of object positions.

5. The method of claim 1 wherein said predetermined continuous harmonics is of a number, which is less than the number of said X-ray projection image data values.

6. The method of claim 1 wherein said predetermined continuous harmonics is of a number, which maximizes the signal-to-noise ratio of the reconstructed attenuation density of said object.

7. The method of claim 1 wherein said X-ray projection image data values are obtained from X-ray absorption or transmission measurements, and said integrals of the attenuation density of said object are each an integral along a straight line along which X-rays traveled to produce the related X-ray projection image data value.

8. The method of claim 7 wherein said X-ray projection image data values are tomosynthesis data values, and said reconstruction is a tomosynthesis reconstruction.

9. The method of claim 7 wherein said X-ray projection image data values are tomographic, PET, or SPECT data values, and said reconstruction is a tomographic, PET, or SPECT reconstruction.

10. The method of claim 1 wherein each said sum of sums of said predetermined continuous harmonics is computed, numerically or analytically, prior to obtaining said X-ray projection image data values.

11. The method of claim 1 wherein said sum of predetermined continuous harmonics with unknown coefficients are selected depending on their estimated signal-to-noise ratio.

12. The method of claim 1 wherein said sum of predetermined continuous harmonics with unknown coefficients are selected depending on the quality of the matrices arising in the equations determining coefficients.

13. A method for reconstruction of the attenuation density of an object from X-ray projection image data values, comprising the steps of:

- approximating the attenuation density $S(x,y,z)$ of said object by predetermined continuous harmonics $H_{ijk}(x,y,z)$ with unknown coefficients a_{ijk} according to $S(x,y,z) \approx \Sigma\, a_{ijk}*H_{ijk}(x,y,z)$, where the number of said harmonics is lower than the number of said X-ray projection image data values;

- relating each of said X-ray projection image data values $V(p_q)$ to the attenuation density of said object according to $-\ln(V(p_q) = S(p_q)$, $q = 1, 2, 3, \ldots$, where $S(p_q)$ is a sum of attenuation density values of said object;

- relating each of said X-ray projection image data values $V(p_q)$ to said harmonics according to $-\ln(V(p_q)) = \Sigma\, a_{ijk}*H_{ijk}(p_q)$ to form a linear equation system, where $H_{ijk}(p_q)$ is a sum of harmonics corresponding to said sum of attenuation density values of said object;

- calculating the unknown coefficients a_{ijk} by solving said linear equation system; and

- reconstructing the attenuation density of said object by calculating $S(x,y,z) \approx \Sigma\, a_{ijk}*H_{ijk}(x,y,z)$.

14. The method of claim 13 wherein said X-ray projection image data values are obtained from X-ray transmission measurements, and said sums of attenuation density values $S(p_q)$, $p = 1, 2, 3,$

…, are each a sum along a respective straight X-ray path from an X-ray source to a pixel of a detector, in which pixel the corresponding X-ray projection image data value was detected.

15. A computer program product loadable into the internal memory of a computer, comprising software code portions for performing the method of claim 1 or 13 when said product is run on said computer.

16. An apparatus for reconstruction of the attenuation density of an object from X-ray projection image data values, said apparatus comprising:

- means provided to represent the attenuation density of said object by a sum of predetermined continuous harmonics with unknown coefficients;

- means provided to relate each of said X-ray projection image data values to an integral of the attenuation density of said object, and thus to a corresponding sum of sums of said predetermined continuous harmonics with unknown coefficients;

- means provided to determine said unknown coefficients from the relations between each of said X-ray projection image data values and the respective corresponding sum of sums of said predetermined continuous harmonics with unknown coefficients; and

- means provided to reconstruct the attenuation density of said object by said sum of predetermined continuous harmonics with said determined coefficients.

17. An X-ray examination system comprising:

- the apparatus for reconstruction as claimed in claim 16;

- an X-ray detector provided to produce the X-ray projection image data values; and

- a display unit for displaying object attenuation density values, wherein

- said apparatus for reconstruction is provided (i) to receive the X-ray projection image data values from said X-ray detector, and (ii) to supply data regarding the attenuation density of said object to said display unit.